W.S.S. #13

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E. K.

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APPARATUS SERVICE REPAIR INSTRUCTIONS

CINE-KODAK K-100 CAMERA

Repair at Branches

Effective immediately, the Cine-Kodak K-100 Camera is to be repaired by the Apparatus Service Department in Rochester and all divisions. This bulletin supersedes ASRI #329 of March 1955.

Enclosed is a tentative list of parts for the camera, motor drive shaft, hand crank and field case. An initial supply of parts indicated in the first column by quantities, will be shipped to each domestic division on Rochester S.O.'s; no division fanfold orders will be necessary. Please reorder in the usual manner when necessary, but only in reasonable quantities, and in accordance with practical estimates of usage.

The following special tools used on other models, are also used on the K-100 and are available from Repair Parts Service:

#30 - Jeweler's screwdriver
#68 - Frame line film
#249- Special Jeweler's screwdriver bit for aperture plate screws
#681- Jeweler's screwdriver bit for Phillips screws
#887- Jeweler's screwdriver bit for Fulcross screws

The following new tools are being sent to each domestic division and Canadian Kodak immediately:

#905 - "Go, No-Go" Gauge for claw protrusion
#907 - Frame line adjusting tool
#908 - Aperture plate alignment fixture
#909 - Fixture for adjusting claw centering
#910 - "Go" gauge for take-up torque
#911 - "No-Go" gauge for take-up torque
#912 - Finder alignment fixture

A precision frame line gauge (Tool #906) has been developed and is being used in Rochester because of its accuracy and speed. This gauge will not be sent to the domestic divisions or Canadia Kodak due to its high cost. However, if extreme accuracy is required, it is recommended that the camera in question be returned to Rochester for adjustment, or a frame line gauge (Tool #906) be purchased from Repair Parts Service.

Tentative repair instructions, including a trouble and remedy chart, are attached.

EASTMAN KODAK COMPANY

PARTS LIST #7004

W.L. LAKE, MANAGER

APPARATUS SERVICE DEPARTMENT

CINE-KODAK K-100 CAMERA

Trouble and Remedy Chart

Trouble	Cause and/or Remedy
Speeds out of adjustment	See Instruction II-E
Noisy mechanism	Improper clearance of gears Add washers (Part #127963) on outside of motor, if not already there. Adjust governor shaft rear bearing
Scratches film	Emulsion build-up on pressure pad Protrusions on pressure pad assembly Bind in sprocket rollers
Mechanism slow in starting	Lack of lubrication or binds, especially pull-down claw cam. See lubrication, Instruction II-J.
Camera jammed	Claw follower disengaged from the cam track usually caused by improper loading of film.
Claw not engaging perforations properly	Claw protrusion out of adjustment caused by too much end play on governor shaft. Set-screw on stop cam may have vibrated loose causing shaft to move in or out.
Frame line out of adjustment	See Instruction II-B
Film not taking up properly	See Instruction II-G
Finder not aligned properly	See Instruction II-F
Loss of loop	Adjust set-screw on pressure pad. Check pins for binds.

CINE-KODAK K-100 CAMERA

Tentative Repair Instructions

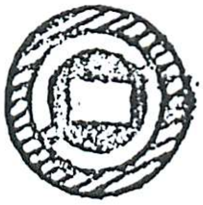
Disassembly and reassembly

A. Finder objective lens

Remove the lens assembly from the camera in the usual manner and pull out the rear retainer with a pair of tweezers. The balance of the parts can then be removed in the following order:

1. Cover glass
2. Brass washer
3. Reticle
4. Spacer
5. Lens (convex surface toward front)

Position the reticle in the finder so that it appears as shown when viewed from the rear:



The front lens assembly should not be moved in the mount; cleaning the rear surface can be accomplished by removing the above parts.

B. Sprocket

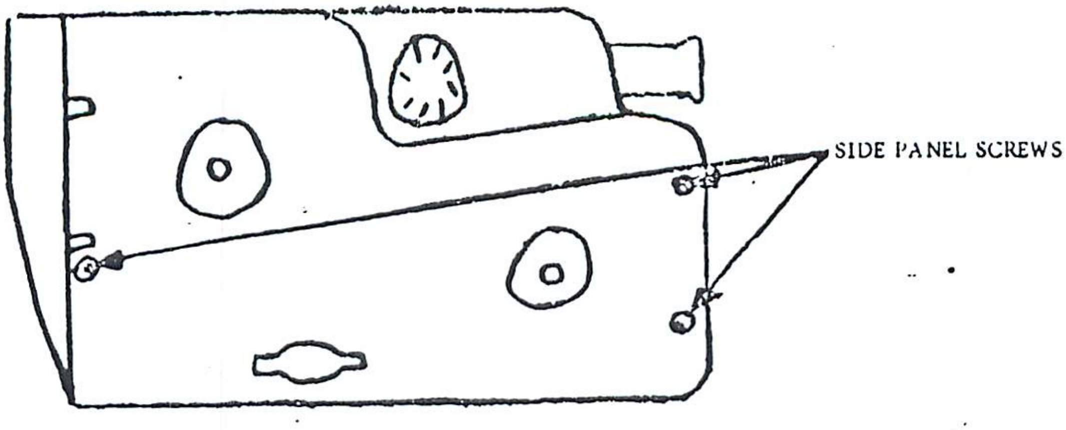
The sprocket is disassembled from the camera by removing the sprocket guard and loosening the set-screw holding the sprocket to the shaft.
Caution: The shaft may slide in or out which disengages the gears in the mechanism.

In reassembling the sprocket it is necessary that two teeth be oriented evenly between the two top rollers; otherwise, the film cannot be threaded properly. Start and stop the mechanism several times to assure that the sprocket teeth always stop in the correct position.

C. Side panel

1. Disassembly

(a) Remove the threading plate (6 screws)
(b) Remove the three side panel screws
(See sketch on next page)



(c) Remove the winding handle by turning the screw in a counter-clockwise direction.
(d) Remove the motor drive access hole screw.
(e) Set speed dial at "16" and remove cover, rear end first.
(f) If yarn is used as a light-leak seal between the shutter housing and the panel, it is recommended that it be removed and the edge of the panel scraped clean.

2. Reassembly

(a) If yarn was used as a light-leak seal it will be necessary to replace it with a bead of CW 8087 sealer placed along the same edge.
(b) Set speed dial at "16", trigger parallel to top and bottom of camera, and engage the erector lever in the sliding erector assembly.
(c) Slide the cover in place and check the controls for correct operation while holding cover on the camera.

    (1) Speed dial, when turned clockwise, will stop halfway between "64" and "16"; when turned counter-clockwise, will stop at "16".
    (2) Trigger will be parallel to top and bottom in "stop" position and can be moved up for single frame; down for continuous running.
    (3) Finder focus knob will make about 1/3 a revolution. This can be checked further by attaching the finder objective lens and observing the focus while turning the knob.

(d) Assemble the winding handle and motor drive access hole screw to the camera.
(e) Replace and tighten the three side panel screws.

(f) Replace the threading plate and assemble with the six screws.
(g) Check the crack between the shutter housing and the camera for sufficient light-leak sealing material (CW 8087) and clean the excess from the panel and shutter housing.
(h) Check for light leak photographically-Tri-X Film, #2 photoflood in a metal reflector about 10 inches from camera, 10 minutes exposure per side, aperture at f/22. The picture area will not be fogged except for one frame at the aperture.

D. Footage Dial

1. Disassembly

(a) Remove the side panel (Section I-C)
(b) Remove three screws holding the footage dial cover--screws located at top of camera towards the rear; one in front camera eyepiece casting (small screw), one about an inch and a half towards the front of the camera, and the third about an inch towards the rear.
(c) Remove the footage dial cover and the dial can be lifted out. (Note position of washer).

2. Reverse the procedure to reassemble.

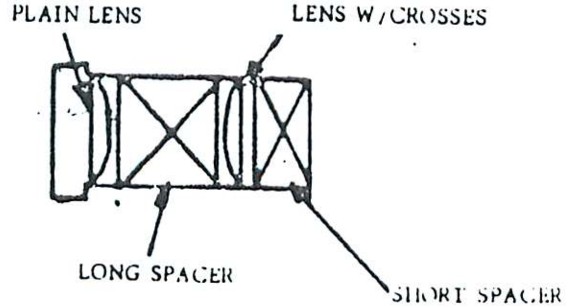
E. Finder eyepiece

1. Disassembly

(a) Remove the side panel and the footage dial cover (Sections I-C & D).
(b) Loosen the two set screws located at the rear of the footage dial cavity.
(c) Hold the camera vertically, eyepiece down, and slide out the eyepiece assembly.
(d) The interior parts of the finder can then be slipped out.

2. Reassembly

(a) Assemble the optics in the finder as shown in the sketch:

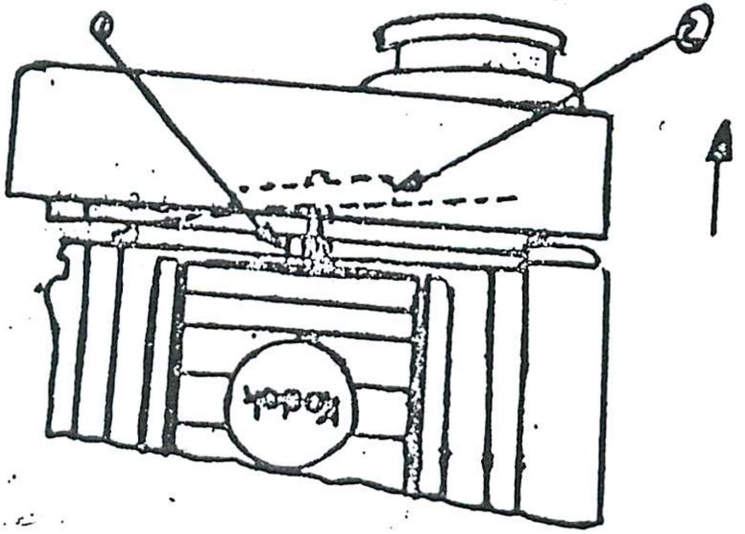


(b) It is recommended that about three drops of Vulcolac be spaced around the edge of the short spacer to hold the lens with the crosses in place.
(c) Assemble the eyepiece to the camera and tighten the two set screws (for adjustment see Section II-F).
(d) Reassemble the footage dial cover and side panel to the camera.

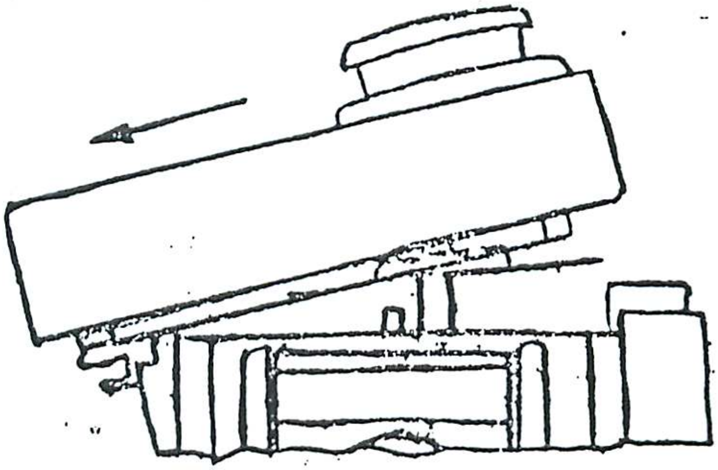
F. Shutter housing

1. Disassembly

(a) Remove the cover, the finder objective lens and the taking lens.
(b) Remove the nameplate and the three shutter housing screws from the front of the camera.
(c) Run a knife blade between the shutter housing and the side panel to break the light-leak seal.
(d) Carefully work the shutter housing straight out from the camera body until the dowel pins (1), located at the top and bottom of the camera, are clear of the housing.
Caution: Do not bend the shutter blade. (2)



(e) Tilt the housing slightly, as shown, and slide it in the direction of the arrow, being careful not to bend the shutter blade.



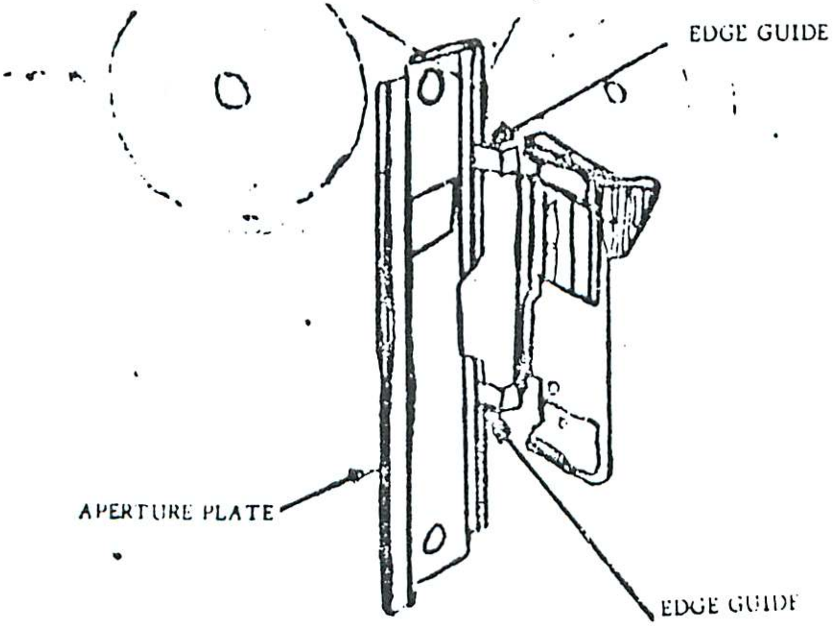
(f) If yarn is used as a light-leak seal between the housing and the side panel, it is recommended that it be removed and the edge of the camera scraped clean.

2. Reassembly

(a) If yarn was used as a light-leak seal, it will be necessary to replace it with a bead of CW 8087 sealer placed along the same edge.

(b) Assemble the shutter housing to the camera, reversing the same procedure used for disassembly, being careful not to damage or bend the shutter blade.

(c) Engage the dowel pins in the turret and press it firmly on the camera. Be sure that the edge guides are located between the aperture plate and camera.

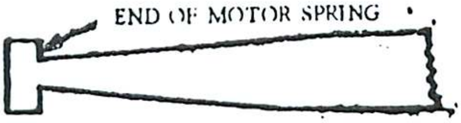


(d) Tighten the three mounting screws and check to be sure housing fits snugly against camera.
(e) Check the crack between the housing and camera for sufficient light-leak sealing material (CW 8087) and clean the excess from the body of the camera and housing.
(f) Fit the nameplate and check operation of camera.

G. Motor

1. Disassembly

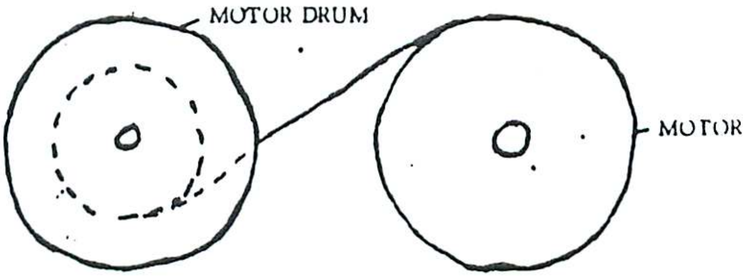
(a) Remove the side panel (Section I-C)
(b) Run down mechanism
(c) Set trigger in "stop" position and rotate governor in normal operating direction (up) until the cam steps against the trigger.
(d) Remove motor cover plate (3 screws).
(e) Remove coil spring from motor stops (bottom of camera) and remove the stop assembly.
(f) Set Trigger in "continuous run" position.
(g) Manipulate the end of the motor spring out of the hole in the motor drum by twisting the spring and sliding it out on a diagonal.



(h) Lift out the motor

2. Reassembly

(a) Hold moter with large plate up, insert end of spring diagonally in rectangular opening of motor drum and hook firmly in position.



(b) Set trigger in "lock" position and rotate motor drum clockwise so a little tension is on the motor.
(c) Assemble motor stops and spring to camera.

(d) Assemble motor cover plate to camera, being sure that the motor spring is in the slot of the spring indicator.
(e) Check operation of camera for binds, motor spring rubbing against hub, etc.
(f) No lubrication is required on the motor.

H. Governor housing

1. Disassembly

(a) Remove side panel and shutter housing (Sections I-C & F).
(b) Remove the shutter blade (1 screw), being careful not to damage the blade.
(c) Slide something between the claw and bracket to hold tension on the claw and prevent it from falling out.
(d) Remove the motor cover plate (3 screws) and unhook the speed control spring.
(e) Remove the four screws holding the governor housing in place and lift out the housing, noting any washers or shims.
(f) The balance of the parts can now be removed from the housing.

2. Reassembly

(a) Reverse the disassembly procedure, being sure all washers and shims are in place and that the pin controlling pressure pad tension is in place. Drop of oil (CW 7611) in cam track.
(b) Check and adjust backlash of nylon gear by rotating rear governor bearing.
(c) Check and adjust claw centering, frame line, claw protrusion, pressure pad tension and speeds (Section II).

I. Claw Assembly

1. Disassembly

(a) Remove shutter housing and shutter blade (Section I-F).
(b) Force a knife blade between the claw leaf springs and the claw bracket to relieve the tension and slide out the claw, noting that three steel balls are used (2 large, 1 small).

2. Reassembly

(a) Force a knife blade between the claw leaf springs and the claw bracket to relieve the tension.

(b) Lubricate the large hole in the bracket with Molykot CW 6782 and drop in one of the large balls.
(c) Lubricate the ball recesses in the claw (CW 6782) and drop the other large ball in the small hole and the small ball the large recess.
(d) Slide claw into position and remove knife blade.
(e) Assemble shutter to camera - drop of oil (CW 7611) in cam track and check all claw adjustments (Section II).
(f) Reassemble shutter housing to camera.

II. Adjustments

Caution: Certain of these adjustments are inter-related; adjustment of one may require checking others.

A. Claw centering

Claw centering is checked by inserting a piece of film in the camera and observing the horizontal position of the claw in the perforation, while operating the mechanism by hand. (Can be checked with either the shutter housing or Tool 909 assembled to camera). The claw should be centered in the perforations during the complete "pull" stroke.

To adjust centering:

1. Remove shutter housing (Section I-F).
2. Assemble Tool 909 to the camera in place of the shutter housing.
3. Loosen the two screws holding the claw bracket and move the bracket in the correct direction.
4. Check centering with film (see above).
5. Assemble the shutter housing to the camera and again check the centering.

B. Frame line

Frame line can be checked with the camera completely assembled or partially disassembled, as long as the shutter housing is in place, by using 16mm frame line film (Tool 68). Operate the mechanism by hand with mechanism run down and observe the position of the frames, which should be centered between the scribed lines when the shutter is open.

Adjustment is made as follows:

1. Remove the side panel (Section I-C).
2. Slightly loosen the three front governor housing screws.
3. Use Tool 907 as a lever to move the governor housing up or down.

Caution: Do not pry against the finder erection mount.

4. Tighten the three screws and again check frame line, making any necessary readjustments, and reassemble the camera.
5. Make a photographic test at all speeds and examine the frame line position. The frame line when checked at 16 frames per second and 24 frames per second shall be centered on the perforation center line to within .005". For other speeds, the frame line shall very no more than .003" from the 16 and 24 frames per second position.
6. Adjust and check camera until frame line is within the above tolerances.

A precision gauge (Tool 906) has been designed to avoid using the above trial-and-error method, but due to its very special and precise nature is quite expensive. This gauge should be used if extremely accurate frame line position is important, or if the volume of work demands it. The procedure for checking and adjusting frame line, using Tool 906, is as follows:

1. Remove the side panel and shutter housing (Section I-C & F).
2. Run the mechanism completely down and leave the trigger in the "run" position.
3. Rotate the shutter away from the pressure pad, open the pressure pad, and attach the gauge to the camera with the two screws.
4. Turn the mechanism very slowly, by hand, observing the dial indicator. A claw properly adjusted for frame line will cause the dial gauge pointer to go beyond zero and make one complete revolution to zero again. Tolerance is ± .001".
5. Adjust the frame line as described above and recheck, readjusting if necessary.
6. It is recommeded that a photographic test be made as above, but it is not completely essential since the gauge is designed to compensate for film pull, etc.

C. Claw protrusion

Claw protrusion must be checked during the complete "pull" stroke of the claw, using tool 905. Place the tool on the aperture plate with the extension over the claw and pointing down, and slide it along the plate while operating the mechanism by hand. The claw must clear the first step of the gauge, but not the second step, during the full stroke. Adjustment is made with the brass eccentric screw located on the opposite side of the camera from the rear governor shaft bearing.

D. Pressure pad tension

The pressure pad tension automatically changes, depending upon the setting of the speed indicater. This tension is measured at the center of the aperture plate, with the camera run down using a push-type scale through the lens opening. Specifications at the break-away point are:

At the 16 frames per second setting - 1½ to 2 oz.
At the 64 frames per second setting - 3 3/8 to 3 5/8 oz.

To adjust the tension:

1. Remove the side panel (Section I-C).
2. Remove the retaining ring holding the speed cam and lift off the cam.
3. Turn the hub beneath the cam to change the tension (clockwise to increase).
4. Replace the cam and recheck the tension.
5. Reassemble the camera.

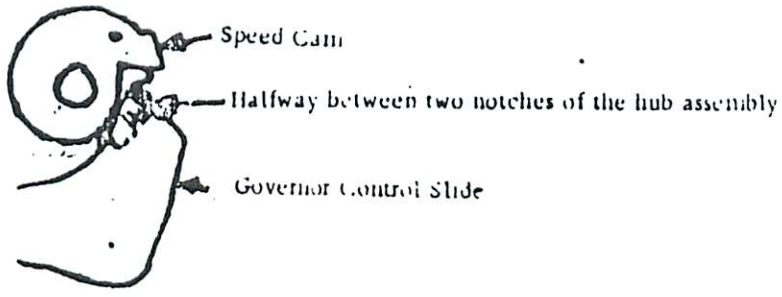
E. Speeds

Specifications without film at full wind:

Speed Dial Setting	Tolerance	Number of Revolutions of Winding Crank in 10 Seconds
16	15-19	6 1/4 - 7 3/4
24	22-26	9 1/4 - 10 3/4
32	30-34	12 1/4 - 14
48	45-51	18 3/4 - 21 1/4
64	60-68	25 - 28 1/4

To adjust speeds:

1. Remove the side panel (Section I-C).
2. Loosen the screw in the camera casting just above the motor.
3. Slightly loosen the two screws holding the fixed slide assembly.
4. Set speed cam at 16 (counter-clockwise against the stop).
5. Run the mechanism (fully wound) and slide the fixed slide assembly either forward or back to bring the speed within tolerance, then tighten the screws.
6. Set speed cam at 64 (see sketch).



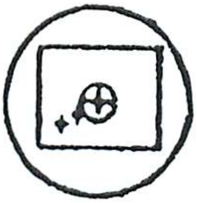
Check and adjust as above.

7. Check and adjust as above.
8. Recheck and readjust the 16 and 64 speeds until each is within tolerance.
9. Move the arm, underneath the screw loosened in step 2, towards rear of camera until it stops (do not force). Hold the arm in position and tighten the screw.
10. Using a .010 feeler gauge, set the clearance between the governor and the rear stop on the fixed slide assembly. Adjust by bending the stop.
11. Check at all speeds.

F. Finder alignment

1. Checking

   a. Attach Tool 912 to the camera in place of the front finder objective lens and sight through the finder at a white object, such as a piece of paper.
   b. If the finder is aligned properly, the heavy cross will be in the center of the small circle (centering), and the legs of the crosses will be parallel to the sides of the rectangle with the two smaller crosses angled down to the left (orientation).



2. Adjusting for centering

   a. Remove the side panel (Section I-C).
   b. Loosen the screw holding the front of the finder erector assembly.
   c. Move the erector assembly up or down to center the cross vertically. Turn the stud (holding the front screw) in or out to center the cross horitontally.
   d. Hold the stud and tighten the front erector assembly screw and check the finder.

3. Adjusting for orientation

   a. Remove the side panel and the footage indicator (Section I-C & D).

b. Loosen the two set screws at the rear of the footage dial cavity, and rotate the rear eyepiece to the correct position.

c. Tighten the two set screws and check the finder.

G. Take-up torque

Take-up torque is measured using Tools No. 910 and 911 in the following manner:

1. Wind camera fully, set speed at 16 fps and place the take-up torque "Go" gauge (Tool 910) on the take-up spindle.
2. With the camera in a level operating position, start the mechanism and the gauge should revolve. If it does not, torque is too low.
3. Place the "No-Go" gauge (Tool 911) on the post of Tool 910 and repeat as above. The gauge should not revolve, more than once. If it does, torque is too high.
4. If torque is not correct, check the take-up belt and replace if necessary.

H. Edge guide tension

The tension of the two edge guides is measured next to the aperture plate with a push-type scale. Specifications at the break-away point: 1 to 2 oz. Adjustment is made by reforming or re-locating the two guides.

I. Aperture plate alignment

The aperture plate is located on the shutter housing so that the center of the lens is aligned with the center of the aperture, and it should not be relocated for any reason. If the aperture plate has been moved, it will be necessary to realign the aperture using Tool 908 in the following manner:

1. Remove the shutter housing from the camera (Section I-F).
2. Loosen the two screws holding the aperture plate to the housing (Tool 249 is adequate for this purpose, although it might be necessary to make a slight alteration for clearance).
3. Assemble the Tool 908 to the shutter housing with the two pins of the gauge in the pin holes of the housing and with the aperture block in the aperture.
4. Hold the aperture plate firmly and squarely against the long edge of the tool and tighten the two screws.
5. Reassemble the housing to the camera.

J. Lubrication

1. CW #7611 - Cosmolubric #276 oil is used in the following places:

   a. Motor stop studs
   b. Adjustable bearing assembly (rear bearing on governor shaft).
   c. Bearing between main drive gear and T.U. spindle plate.
   d. Take-up spindle.
   e. Footage dial lever.
   f. Footage lever pivot stud.
   g. Cover latch stud.
   h. Release lever support roller.
   i. Release lever roller.
   j. Governor cam hub post.
   k. Governor clutch roller.
   l. Finder pivot stud (located on side panel).
   m. Footage dial ratchet post
   n. Sprocket shaft and rollers.
   o. Footage dial gear.
   p. Motor take-up shaft
   q. Motor drum shaft.
   r. Speed compensator and governor control slide.
   s. Motor cover plate bushing.
   t. Winding handle pivot stud.
   u. Pressure pad pivot point
   v. Pull-down cam
   w. T.U. Belt pulley

2. CW #6782-Molykote and grease is used in the following places:

   a. Cover lock knob
   b. Center rail under cover latch
   c. Slots of latch
   d. Governor shaft
   e. Release lever slide
   f. On side panel - all bearing surfaces around trigger and all bearing surfaces around finder focus knob and speed control knob.
   g. Both ends of variable pressure pad pin
   h. Contact ear of pressure pad
   i. Ball bearings in pull-down claw

3. #392 - rust ban oil is applied to the motor hubs.

4. Any heavy grease on the release lever spring.